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Docket No.: 501.43644X00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

Kyosuke ACHIWA

Serial No. 10/797,052

Filed: March 11, 2004

For: CONTROL METHOD FOR STORAGE SYSTEM, STORAGE
SYSTEM, AND STORAGE DEVICE

SUPPLEMENTAL PETITION TO MAKE SPECIAL
UNDER 37 CFR \$1.102(MPEP \$708.02)

June 10, 2005

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Supplemental to the Petition to Make Special filed on April 13, 2005,
Applicants submit the following additional remarks.

It is submitted that the cited references, whether considered alone or in combination, fail to disclose or suggest the invention as claimed. More particularly, the cited references, at a minimum, fail to disclose or suggest in combination with the other limitations recited in the claims:

a first feature of the present invention as recited in independent claim 1 wherein the second storage device requests first information from the first storage device indicating that a replication of the data written in the first storage area has not yet been transmitted to the second storage device and that the replication of the data has not been written to the second storage area when

notice of failover is received from the second information processing device, and the second storage device refers the first information upon receipt of a data read request transmitted from the second information processing device in which failover has occurred, requests the target data of the data read request from the first storage device when it is concluded that the target data of the data read request are stored in the first storage area, and transmits to the second information processing device the target data of the data read request transmitted from the first storage device as per the request;

a second feature of the present invention as recited in independent claim 8 wherein when notice of failover is received from the second information processing device during execution of the first processing, the channel controller requests first information from the first storage device indicating that the replication of the data written in the first storage area has not yet been transmitted to the second storage device, and that a replication of the data has not been written to the second storage area, and that the channel controller refers the first information when a data read request transmitted from the second information processing device in which failover has occurred is received, requests the target data of the data read request from the first storage device when it is concluded that the target data of the data read request are stored in the first storage area, and transmits to the second information processing device the target data of the data read request transmitted from the first storage device as per the request;

a third feature of the present invention as recited in independent claim 15 wherein when notice of failover is received from the second information processing device during executing of the first processing, the channel controller requests first information from the other storage device indicating that a replication of the data written in the first storage area has not yet been transmitted to the storage device, and that a replication of the data has not been written to the second storage area, and that the channel controller refers the first information when a data read request transmitted from the second information processing device in which failover has occurred is received, requests the target data of the data read request from the other storage device when it is concluded that the target data of the data read request are stored in the first storage area, and transmits to the second information processing device the target data of the data read request transmitted from the other storage device as per the request; and

a fourth feature of the present invention as recited in independent claim 18 wherein when notice of failback is received from the first information processing device during execution of the first processing, the channel controller requests second information from the other storage device indicating that the data written in the third storage area has not yet been transmitted to the storage device, and that the data has not been written to the first storage area, and that the channel controller refers the second information when a data read request transmitted from the first information processing device in which failback has occurred is received, requests the target data of the data read request from the other storage

device when it is concluded that the target data of the data read request are stored in the third storage area, and transmits to the first information processing device the target data of the data read request transmitted from the second information processing device as per the request.

The references considered most closely related to the claimed invention are briefly discussed below:

U.S. Patent No. 5,051,887 (Berger et al.) discloses a system that manages storage devices and maintains synchronization between a first and second data storage device. The system includes a set of tables to indicate which records to update, and uniquely identifies fields on the data storage devices for the purpose of duplicating the fields to another medium. The system performs a dual copy function, using a set of status information, to allow only the changed records to be copied to a secondary device of the dual copy. (See, e.g., Abstract and column 2, lines 19-49.) However, unlike the present invention, Berger et al. does not disclose that a second storage device requests first information from a first storage device indicating that a replication of data written in the first storage area has not yet been transmitted to a second storage area when notice of failover is received from a second information processing device. More particularly, Berger et al. does not disclose or suggest the above described first feature of the present invention as recited in independent claim 1, the above described second feature of the present invention as recited in independent claim 8, the above described third feature of the present invention as recited in

independent claim 15, and the above described fourth feature as recited in independent claim 18, in combination with the other limitations recited in each of the independent claims.

U.S. Patent No. 5,592,618 (Micka et al.) discloses a continuously running remote copying system that performs a comparison between data located in a primary site to data located in a secondary site. This system performs a comparison of selected data at a point in time at a primary site with a copy of that data at a secondary site at the same logical point in time in an update sequence. (See, e.g., Abstract and column 4, line 60, through column 6, line 16.) However, unlike the present invention, Micka et al. does not disclose that a second storage device requests first information from a first storage device indicating that a replication of data written in the first storage area has not yet been transmitted to a second storage area when notice of failover is received from a second information processing device. More particularly, Micka et al. does not disclose or suggest the above described first feature of the present invention as recited in independent claim 1, the above described second feature of the present invention as recited in independent claim 8, the above described third feature of the present invention as recited in independent claim 15, and the above described fourth feature as recited in independent claim 18, in combination with the other limitations recited in each of the independent claims.

U.S. Patent No. 6,618,794 (Sicola et al.) discloses a data replication system which generates a virtual point in time copy of a selected volume of a storage system. The system performs a copying of data from a selected volume

to a temporary volume. When attempting to read data from the temporary volume, the system checks the bitmap to determine if the requested data has already been copied from the selected volume to the temporary volume. If the requested data has already been copied over to the temporary volume, the data is read from the temporary volume. If not, the data is read from the selected volume. (See, e.g., Abstract, and column 1, line 41, through column 2, line 19.) However, unlike the present invention, Sicola et al. does not disclose that a second storage device requests first information from a first storage device indicating that a replication of data written in a first storage area has not yet been transmitted to a second storage area when notice of failover is received from a second information processing device. More particularly, Sicola et al. does not disclose or suggest the above described first feature of the present invention as recited in independent claim 1, the above described second feature of the present invention as recited in independent claim 8, the above described third feature of the present invention as recited in independent claim 15, and the above described fourth feature as recited in independent claim 18, in combination with the other limitations recited in each of the independent claims.

U.S. Patent No. 6,671,705 (Duprey et al.) discloses a remote mirroring method and system that includes a master storage unit that utilizes a write intent log to resynchronize slave images following a failure in the master storage unit. The write intent log is preserved through the failure, so that the write intent log is available to the master storage unit upon recovery from the failure. The write intent log identifies any portions of the slave images that may be unsynchronized

from the master image. The master storage unit resynchronizes only those portions of the slave images that may be unsynchronized as indicated in the write intent log. (See, e.g., Abstract, and column 2, line 66, through column 3, line 19.) However, unlike the present invention, Duprey et al. does not disclose that a second storage device requests first information from a first storage device indicating that a replication of data written in the first storage area has not yet been transmitted to a second storage area when notice of failover is received from a second information processing device. More particularly, Duprey et al. does not disclose or suggest the above described first feature of the present invention as recited in independent claim 1, the above described second feature of the present invention as recited in independent claim 8, the above described third feature of the present invention as recited in independent claim 15, and the above described fourth feature as recited in independent claim 18, in combination with the other limitations recited in each of the independent claims.

U.S. Patent Publication No. 2001/0008008 (Mori), discloses an information recording apparatus capable of continuing an appropriate update processing in the case where the data update processing is stopped on one processing apparatus due to a power failure or memory failure, by using non-updated data stored in duplicate in another processing apparatus. The data is stored temporarily in the memory of one controlling unit and at the same time is stored in a duplicate memory of another controlling unit, so that when the data processing carried out by one controlling unit is stopped, the processing can be continued by the other controlling unit by using the duplicated data. (See, e.g.,

Abstract and paragraphs 17-20.) However, unlike the present invention, Mori does not disclose that a second storage device requests first information from a first storage device indicating that a replication of data written in the first storage area has not yet been transmitted to the second storage area when notice of failover is received from the second information processing device. More particularly, Mori does not disclose or suggest the above described first feature of the present invention as recited in independent claim 1, the above described second feature of the present invention as recited in independent claim 8, the above described third feature of the present invention as recited in independent claim 15, and the above described fourth feature as recited in independent claim 18, in combination with the other limitations recited in each of the independent claims.

U.S. Patent Publication No. 2003/0145179 (Gabber et al.) discloses a data replication system that includes a host computer, an interconnecting network, and a plurality of storage devices that are divided into host elements and a plurality of storage elements. One or more host elements are associated with the host computer and a storage element is associated with and connected to each of the plurality of storage devices. The host computer and a host element are connected to a plurality of storage devices, in which the data is replicated between the storage devices to maintain data consistency. The host element determines which storage elements do not contain certain up-to-date data in the associated storage device, and then recovers that data from one of the other storage elements and its associated storage device. (See, e.g.,

Abstract and paragraphs 7-8.) However, unlike the present invention, Gabber et al. does not disclose that a second storage device refers a first information upon receipt of a data read request transmitted from a second information processing device in which failover has occurred, requests the target data of the data read request from a first storage device when it is concluded that the target data of the data read request is stored in a first storage area, and transmits to the second information processing device the target data of the data read request transmitted from the first storage device as per the request. More particularly Gabber et al. does not disclose or suggest the above described first feature of the present invention as recited in independent claim 1, the above described second feature of the present invention as recited in independent claim 8, the above described third feature of the present invention as recited in independent claim 15, and the above described fourth feature as recited in independent claim 18, in combination with the other limitations recited in each of the independent claims.

U.S. Patent Publication No. 2003/0182525 (O'Connell et al.) discloses a method and system for data migration from an original host storage system to a replacement host storage system. The method and system achieves the data migration, while maintaining continuous access to the data by clients on the network. When a request is made concerning the data stored in either the replacement host storage system or the original host storage system, it is determined whether the data requested has been migrated from the original host storage system to the replacement host storage system. If the data has been

migrated, then the replacement host storage system acts on the request. If the data has not been migrated, a search is conducted for the data on the original host storage system, and the data is accessed from the original host storage system. (See, e.g., Abstract and paragraphs 11-19.) However, unlike the present invention, O'Connell et al. does not disclose that a second storage device requests first information from the first storage device indicating that a replication of the data written in the first storage area has not yet been transmitted to the second storage area when notice of failover is received from the second information processing device. More particularly, O'Connell et al. does not disclose or suggest the above described first feature of the present invention as recited in independent claim 1, the above described second feature of the present invention as recited in independent claim 8, the above described third feature of the present invention as recited in independent claim 15, and the above described fourth feature as recited in independent claim 18, in combination with the other limitations recited in each of the independent claims.

U.S. Patent Publication No. 2004/0128442 (Hinshaw et al.) discloses a method and apparatus for mirroring data. The apparatus includes a plurality of processing systems, each consisting of one or more disks and a processing unit. Each disk is comprised of at least two data segments, a first data segment and one or more secondary data segments, and may have one or more system segments. Each processing unit is connected to one or more plurality of disks. Once a failure is detected, the logical mirror of data stored in the first data segment of the failed disk is accessible from the secondary data segment of a

non-failed disk. The first data segment can be rebuilt on another disk from the logical mirror stored in the secondary data segment. (See, e.g., Abstract and paragraphs 6-12.) However, unlike the present invention, Hinshaw et al. does not disclose that a second storage device requests first information from a first storage device indicating that a replication of data written in a first storage area has not yet been transmitted to a second storage area when notice of failover is received from the second information processing device. More particularly, Hinshaw et al. does not disclose or suggest the above described first feature of the present invention as recited in independent claim 1, the above described second feature of the present invention as recited in independent claim 8, the above described third feature of the present invention as recited in independent claim 15, and the above described fourth feature as recited in independent claim 18, in combination with the other limitations recited in each of the independent claims.

Therefore, since the references fail to disclose or suggest the above described first feature of the present invention as recited in independent claim 1, the above described second feature of the present invention as recited in independent claim 8, the above described third feature of the present invention as recited in independent claim 15, and the above described fourth feature as recited in independent claim 18, in combination with the other limitations recited in each of the independent claims, it is submitted that all of the claims are patentable over the cited references.

In view of the foregoing, Applicant requests that this Petition to Make Special be granted and that the application undergo the accelerated examination procedure set forth in MPEP 708.02 VIII.

Respectfully submitted,

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